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Intra-abdominal removal of a displaced hip prosthesis

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ABSTRACT

INTRODUCTION: Intra-pelvic displacement of hip prostheses is an uncommon complication following arthroplasty surgery but can have significant detrimental effects on the patient. We present a case of a displaced hip prosthesis into the pelvic cavity and highlight the importance of pre-operative planning and investigation as well as choosing a suitable surgical approach.
PRESENTATION OF CASE: A 69 year old lady with developmental dysplasia of the hips was found to have displacement of her prosthesis into the pelvis on day three following complex uncemented total hip replacement. A subsequent combined procedure between vascular and orthopaedic surgeons was carried out, including access via a laparotomy incision to allow vision and control of the iliac vessels before removal of the prosthesis. The hip was reconstructed during the same operation using a cup cage construct, reinforced with plate fixation of the posterior column of the pelvis.
DISCUSSION: Intra-pelvic displacement of hip prostheses is rare and morbidity and mortality can be significant. Pre-operative imaging modalities such as CT scanning should be used to carefully delineate the anatomy. A retro-peritoneal approach has been reported, but we used a trans-abdominal approach in this case to permit greater vision and control of pelvic structures due to the significant medial displacement of the prosthesis.
CONCLUSION: Intra-abdominal removal of a displaced hip prosthesis is rarely performed but allows for visualisation and careful control of the pelvic structures without damaging further the pelvic wall. We recommend this approach should be performed in conjunction with a vascular surgeon.

1. Introduction

Intrapelvic displacement of hip prostheses is an uncommon complication following arthroplasty surgery. Failure to adequately assess the extent of displacement and involvement of the major pelvic vessels can have significant detrimental effects on the patient with unnecessary morbidity or mortality. In this article, we present a case of arthroplasty component displacement into the pelvis, and stress the importance of pre-operative planning and investigations as well as the surgical approach in order to secure a favourable outcome.

2. Presentation of case

A 69 year old lady with osteoarthritis secondary to developmental dysplasia of the hips underwent complex uncemented total hip replacement on her right side; this was the third revision of that hip. Following her surgery, post-operative radiographs revealed that the cup and the femoral head had displaced through the acetabulum into the pelvis (Fig. 1). A computed tomography (CT) scan showed that the acetabular cup appeared to be medial to both the external iliac artery and vein on the right, although the exact location could not be established due to metal artefacts.

At surgery midline laparotomy incision was made, and bowel mobilised and retracted superiorly in order to gain access to the pelvis. The ureter was seen and protected and the iliac vessels explored. The common internal and external iliac arteries were dissected and vessel loops applied. A retroperitoneal haematoma was found and evacuated. The displaced prosthesis was found in close proximity to the iliac vessels (Fig. 2).

Traction was applied to the leg to enable the femoral head to disengage from the cup (Fig. 3). The polyethylene acetabular liner was then removed from the shell to allow access to the screws. All the screws were removed using a hinged screwdriver (Fig. 4) and the cup removed. Care was taken to ensure that there was no damage to the internal and external iliac veins which were in close proximity. The abdomen was closed with a mass closure technique.

The orthopaedic surgeons performed the reconstruction of the hip under the same anaesthesia. An incision was made over the original posterior approach scar and the femoral component was easily removed. The acetabulum was reconstructed using a cup cage construct, and this was reinforced with plate fixation of the posterior column of the pelvis. The patient recovered well and was able to

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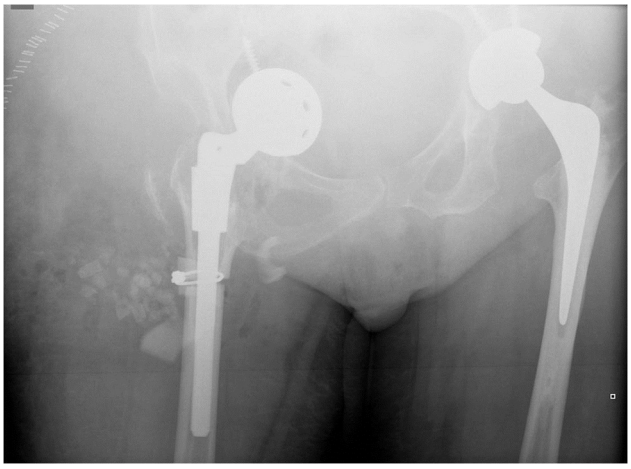

Fig. 1. AP radiograph showing the displaced hip prosthesis into the pelvic cavity.

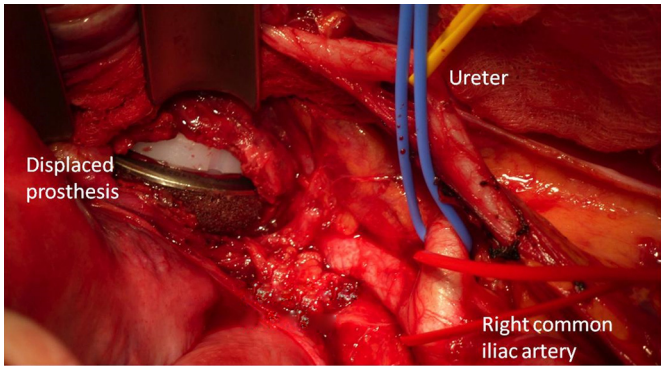

Fig. 2. Identification and control of the iliac vessels and the right ureter.

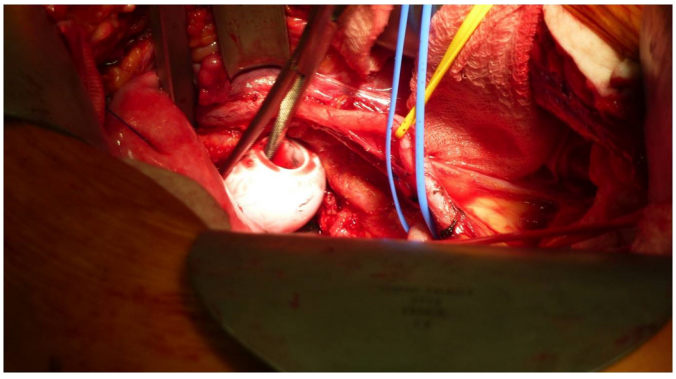

Fig. 3. Removal of the femoral head via an intra-abdominal approach.

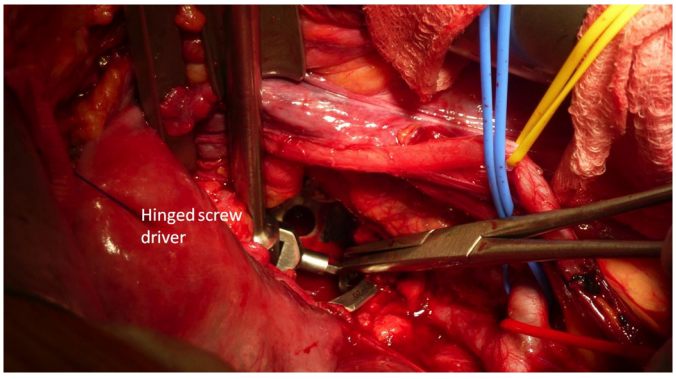

Fig. 4. Removal of the acetabular cup and screws.

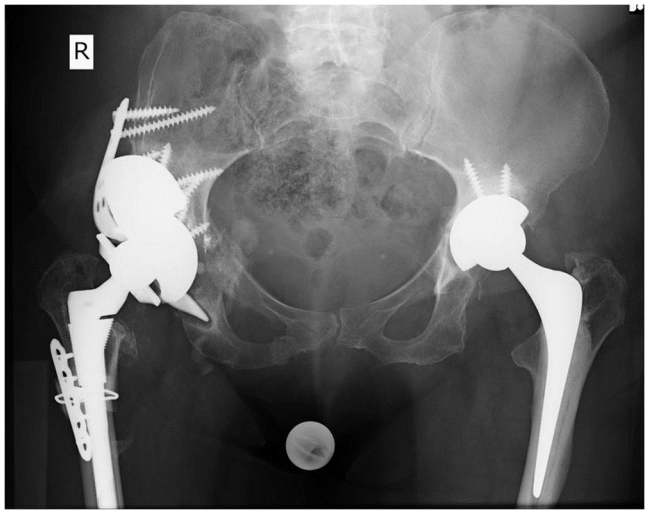

Fig. 5. Post-operative AP radiograph showing the reconstructed right hip.

mobilise with the help of crutches. She was followed up in clinic at four weeks she was found to be doing very well mobilising with one crutch. Check radiographs (Fig. 5) confirming the correct position of the implant.

3. Discussion

Displaced arthroplasty components may be caused by trauma, infection, aseptic loosening, or excessive acetabular reaming leading to intrapelvic migration. Injury to the vasculature during arthroplasty surgery is rare, with a reported frequency of 0.008–0.67%,[1] although this is increased when intrapelvic surgery is required to remove displaced components. Morbidity such as limb loss may be significant, and mortality rates of 7% are quoted in the literature.[1,2] As well as damage to the vasculature, intrapelvic displacement of arthroplasty components beyond the pelvic inlet may damage the sciatic and obturator nerves, the ureters, bladder, bowel and pelvic organs.

The common iliac arteries are the continuation of the aortic bifurcation at the L4 vertebral level, and run along the medial border of psoas, before dividing into external and internal branches. The internal iliac supplies the pelvic structures whilst the external continues along the pelvic brim becoming the femoral artery as it passes beneath the inguinal ligament, to supply the lower limb. The external iliac vein accompanies the artery and their close proximity to the medial acetabular wall puts them at risk from a displaced hip prosthesis.

3.1. Imaging

CT scanning can be used in evaluating the position of the intrapelvic components displaced through the medial acetabular wall. Fehring et al.[3] suggest the addition of contrast to help assess the vasculature, rather than more invasive tests such as angiography. This enables not only the assessment of the acetabulum and pelvic bone stock to aid orthopaedic surgery planning, but also allows visualisation of the pelvic vessels to aid the vascular surgeon in a single, minimally invasive investigation. However, the use of CT with contrast to assess detailed anatomy may be limited in the presence of metallic implants due to artefact, a finding confirmed by Sarasin et al.[4] Likewise, the radiation dose and the risk of contrast allergy or nephrotoxicity is a risk to the patient.

Laparoscopic visualisation of the position of the acetabular cup and femoral head could help in planning the surgery especially if intraperitoneal displacement was suspected.

3.2. Approach

Whilst a standard hip incision may be familiar to the orthopaedic surgeon, this approach gives limited ability in the control of damaged pelvic structures, particularly a bleeding iliac vessel. Therefore a combined procedure with a vascular surgeon experienced in approaching the iliac vasculature through an abdominal incision is important. The retroperitoneal approach, commonly through a Rutherford Morrison incision has been widely used,[2,5–7] but a trans-abdominal incision is rare.[4,8] We chose a trans-abdominal incision in this case as the pelvic component was displaced quite medially, and so allowing us greater control and evaluation of damaged structures.

4. Conclusion

Intra-abdominal or retroperitoneal removal of a displaced hip prosthesis is a rarely performed procedure. However it is an excellent approach to remove displaced prosthetic components as it permits removal of the prosthesis without causing further damage to the pelvic wall, whilst allowing for assessment and control of the pelvic structures. It should be considered more frequently in patients with weak pelvic bones due to severe bony dysplasia or osteoporosis, and a vascular team can provide valuable support during these procedures.

Conflict of interest

There are no conflicts of interest.

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None.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

All authors wrote and edited this paper.

Key learning points:

- Intra-pelvic displacement of hip prostheses is rare but can have significant detrimental effects on the patient.
- An intra-abdominal or retro-peritoneal approach should be used rather than access via the original hip incision, to allow for visualisation and control of damaged pelvic structures.
- Careful pre-operative planning should include MDT discussion and relevant imaging.
- A combined approach between orthopaedic and vascular surgeons, utilising their relative experiences, should be used to ensure a favourable outcome.

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